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The Bureau of Reclamation recently announced that its prime mission since 1902—building dams to make the desert bloom in the American West—is pretty much complete. While never really admitting that its newer projects have been economically infeasible, Bureau management has at last recognized that the days of the big public water project are gone. The Bureau now plans to turn its attention and resources to other more pressing problems, such as helping other agencies with construction projects needed to cope with hazardous waste.

But getting the Bureau out of the dam-building business goes only part of the way toward solving some critical economic problems. For the Bureau policies have left a legacy—irrigation projects that supply water to farmers at subsidized prices—that will continue to impose costs on society greater than the benefits they provide. It is now time to take some steps also to bring those costs and benefits more into line.

Benefits Less Than Costs

Subsidized irrigation projects impose costs on society far greater than most people realize. The problem is not just that the Bureau of Reclamation spends hundreds of millions of taxpayer dollars each year to supply water to farmers at "low" prices. If that money were merely transferred from taxpayers to farmers, there may be little net efficiency loss. But, in actual fact, subsidized reclamation projects squander valuable capital and environmental resources by benefitting farmers far less than taxpayers pay.

We can illustrate this point with numbers representative of the San Joaquin Valley in California. Here the Bureau's Central Valley Project supplies irrigation water. Roughly, the Bureau's separable costs for irrigation (i.e., construction and operation and maintenance (O&M) costs identified only with irrigation use) for the newer projects amount to between \$300 to \$500 per acre-foot of water delivered when appropriate interest charges on the original capital investment are included. For this water, the typical farmer repays the government less than \$20 per acre-foot, some far less. In many cases, even

Cutting the Loss from Federal Irrigation Water Subsidies

by B. Delworth Gardner and Ray G. Huffaker

the O&M costs ranging from \$5 to \$9, exceed what farmers pay. This situation was perhaps the principal motivation for the Reclamation Reform Act of 1982 which increased water prices to those irrigators who do not meet the operated-acreage size requirement of 960 acres.

Studies show that the value of water to farmers in the San Joaquin Valley averages about \$50 per acre-foot. Thus, on average, the farmer captures a net benefit of approximately \$30 per acre-foot delivered. Let us be conservative and assume that such water costs the taxpayers \$300 per acre-foot. Therefore, to supply this \$30 of net benefit to the irrigators, taxpayers have forked out a net \$280 (\$300 less the \$20 farmer repayment to the government.). Most of this "subsidy" has been sunk into physical capital (i.e., dams and canals) that cannot be economically recovered, however.

Some contend that construction of irrigation facilities helps the local economy, so that the loss is not entirely "dead-weight" from the viewpoint of the nation as a whole. We doubt this contention. While some local gains in employment and output result from the building and operating of dams and canals, resources generally utilized are simply transferred from other localities where they would have created similar benefits had the water project not been built.

Why Returns Are Low

One might inquire as to why irrigation water, for which taxpayers pay

so dearly, is of such relatively "small" value to farmers? But what is small? The value of water in irrigation is small: (1) relative to the full costs of supplying the water, and (2) relative to the value of water in most urban uses. Irrigated agriculture uses water intensively and grow-

Subsidized reclamation projects squander valuable capital and environmental resources.

ing irrigated crops (or any other for that matter) is just not very profitable these days.

But irrigation water is not even so valuable as it might be because of government policy. In order to limit the per-farmer sub-

sidy for equity reasons, the 1902 Reclamation Act restricted the amount of land per qualified recipient of subsidized water to a maximum of 160 acres. A 1926 amendment interpreted the act to mean 320 acres for a husband and wife farming together. Farmers, however, were permitted to expand their actual operated acreage beyond 320 acres by

◆ **Subsidized reclamation projects squander valuable capital and environmental resources by benefitting farmers far less than taxpayers pay. Yet, they have made a few irrigators suddenly wealthy. There are several different approaches that could make the system more efficient. One would involve converting current water allocations into firm and permanent property rights of existing irrigators. This approach would facilitate more efficient water transfers to recreational and urban users and provide incentives for water conservation.**

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On newer federal reclamation projects in California, irrigation water costs the taxpayers from \$300 to \$500 per acre-foot, whereas it may be worth \$50 in use. Most farmers pay less than \$20 to obtain it.

Photo courtesy Bureau of Reclamation, USDI.

leasing land from other owners who also qualified to receive subsidized water. In this way, farmers could profit from scale economies (such as larger machinery) that have become available in the post World War II period.

In 1982, however, the law was changed to increase the maximum acreage that could receive subsidized water to 960 acres, but the limit was applied to leased as well as owned land. Any water put on land which exceeded the limitation would be available only at "full cost" rather than at the subsidized price. Full cost would include a charge for capital investment but, for irrigation, interest charges have been waived. Since the subsidy has been so large, the effect is that the full-cost water could be priced at a much higher rate than the subsidized price. The likelihood is great that the impact of the 1982 Act will be to reduce the size of many California farms and thus to raise costs of production.

Extensive controversy exists over whether the original 320-acre restrictions were adequately enforced, especially in areas of California where farms are very large. The important point here is that

water will almost certainly be worth less to farmers now that there appear to be restrictions on its use that prevent the most efficient farm size and structure.

Some People Made Wealthy

Despite acreage limitations that were designed to limit the water subsidy, pricing water below its value has created considerable wealth for a certain class of recipient irrigators. Even a relatively small net benefit, such as \$30 per acre-foot, will push up land prices sharply. A typical contract with the Bureau of Reclamation might provide three acre-feet of water per acre per year for 40 years. As soon as the contract is signed, land is likely to increase in value in excess of \$1500 an acre. By providing three acre-feet of water a year, the contract allows each acre of land to return an additional \$90 a year in net benefits for 40 years. Assuming an interest rate of 5 percent, the present value of that flow of net benefits is \$1544.

It is also expected that contracts will be renewed when the current one expires at terms not far different than those under the initial contract. This means that the

present value of expected future net benefits will be substantial and they will be quickly reflected in the land price. Therefore, the principal beneficiaries of pricing water below its value are the owners of the land at the time the irrigation project begins to deliver water. Subsequent purchasers of land must pay market prices in order to receive entitlement to subsidized water and thus their wealth gains from the subsidy are much more limited.

In sum, most reclamation projects have provided far less farmer net benefits than they have cost the taxpayers, and they have made a few people suddenly wealthy. It might be good public policy now to correct some of these inefficiencies and inequities. But how?

Some Options

One way to make existing reclamation projects, such as the Central Valley Project in California and the Columbia Basin Project in Washington, more equitable to taxpayers would be to raise the price of water to its true full cost. This is a policy commonly advocated by environmental organizations. Unfortunately, for projects

already constructed, this policy makes little economic sense. Priced to the farmer at \$300 per acre-foot, water would be far more expensive than it would be worth under any conceivable irrigation regime. Water simply would go unused—and even the \$50 of water value and \$30 worth of net benefits that currently exist would be lost.

Sadly, taxpayers must realize that sunk costs in the form of dams and canals that represent the bulk of the irrigation subsidy simply are gone forever. They have been the consequence of uneconomic political decisions that gave us premature and infeasible projects. Of course, we can make sure that uneconomic new projects will never be built by insisting that new water be priced at full cost. Who would want new water at a price of \$300 per acre-foot and worth only \$50?

A more feasible way to improve pricing on existing projects would be to renegotiate the price of water when contracts come up for renewal every 40 years or so. In fact, the contract period could also be shortened. The price should be set at the market-clearing level—the price at which all water available could be sold—so long as this price covers the O&M costs of the project (something approximating the average variable costs.)

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If we are correct in this judgment, this pricing approach might place a burden on some farmers already reeling under heavy debts. Raising the price of water will cause land prices to fall, just as underpricing it caused land prices to rise. Many farms have changed hands since underpriced water was first delivered, and the current owners paid for the expected net benefits in the form of higher-priced land as illustrated above. These land owners will lose wealth if water prices go up.

There probably is another alternative that would at once be more equitable to current land owners than simply raising the repayment price and it would be more allocatively efficient at the same time. Current water allocations could be converted into firm



The principal beneficiaries of pricing water below its value are the owners of land at the time the irrigation project begins to deliver water.

Photo courtesy Soil Conservation Service, USDA.

Through time, the price could be tied to a suitable price index that would reflect aggregate price level movements. Thus, inflation could not reduce the real water price over the period of the water contract as now occurs. Our view of the relevant facts would suggest that the market-clearing real price would be well below the full cost of the water for existing projects, but in most cases would be higher than prices now charged.

an even larger share of the economic rents available from the transfer, this could be legally mandated. To reduce the institutional risk of changes in policy that would impede otherwise feasible transfers, it would seem important for all negotiating parties to know in advance what the government would take off the top.

By allowing farmers to sell water at a profit, if they wished, a mechanism would be provided for transferring water to those who value it most. In some cases, farmers might sell their excess water to municipalities or other types of urban and recreational users. Even instream recreational and transport users might buy sufficient rights to guarantee minimum stream flows that they deem desirable.

In nearly every region of the West, agriculture is the marginal user of water in the sense that water is more valuable in other uses. For this reason, the primary sellers of water in a free market would likely be existing irrigators.

Some of the buyers might be urban water users that are looking for ways to augment existing and future supplies. As transfers from agriculture to urban uses occur, water prices in the two sectors would move closer to equality.

Because the consumptive use of agriculture usually exceeds 80 percent of the total water usage in most Western states, a lot of water could be transferred to urban and industrial uses without significantly threatening agricultural viability. In addition, if farmers could transfer water at free market prices, they would have a strong incentive to economize on their water consumption by employing a wide variety of available conservation practices. In a water market, the true opportunity cost of water is what it would be worth in its best alternative use, which would include its transfer value. For these reasons, if water markets existed, it is not obvious to us that the size of the agricultural sector in most areas would be diminished at all.

Yes, the Bureau is off to a good start by implicitly acknowledging that costly new projects are politically infeasible. But reform in the rules and regulations for pricing and allocating existing water is also badly needed.

Irrigation water should be viewed like any other agricultural input and we should rely on market forces to govern its price and allocation. Substantial increases in societal wealth would be the result.



and permanent property rights and issued to existing irrigators. We recommend that the owner of these rights to water be permitted to market them without restriction so long as other existing rights are not thereby impaired. These market exchanges would occur at whatever prices the buyer and seller would find mutually attractive.

The obligation to the government builder of the project could be handled in several ways. At a minimum, the right holder should be obligated to reimburse the federal government for project O&M costs in order to insure that further taxpayer losses be avoided. If it were deemed politically expedient that the taxpayers should receive